AMENDMENTS TO THE SPECIFICATION WITH MARKINGS TO SHOW CHANGES MADE

Amend the following paragraphs:

[0013] -- In particular, the combination of control technology, drive technology and mechanism models are applied together for any type of axis: for ~~a~~ an axis regulated as to position and/or speed and/or momentum, for example, or for an unregulated axis; and the desired parameters for the digitally-controlled machines are controlled by the outputs of NC- and PLC-control models. The result is that machine components subject to different types of control are thus brought together in a single model through the modeling of their respective drive technologies. Significant characteristics of the machine influence the control cycle of the drive models, such as the mass parameters for modeling real acceleration and speed, for example.--.

[0026] --The numerical calculation of the NC-model 4 and the PLC-model 5 takes place in an auxiliary computer 10 that is connected to the digital ~~controller1~~ controller 1. The NC-model outputs a simulated actual NC-axis value xi1 to the mechanism model 8, which is a geometrical kinematic model in this example. The PLC-model 5 outputs a simulated actual PLC-axis value xi2 for the axis to the mechanism model 8. The mechanism, which may have just the two NC and PLC axes, or may include an entire production process, is modeled with the help of the geometrical kinematic model 8 of that mechanism ~~8~~.--.

[0027] --A virtual-sensor and sensing technology are integrated into the geometric kinematic model 8. For example virtual state sensors and virtual limit sensors are integrated into the component structures of the geometric kinematic model, and actuation of one of these virtual sensors indicates a collision between a part of one of the simulated axes ~~with~~ and a feeler gauge, for example, which produces a signal that is coupled as feedback to the digital controller 1. For the sake of clarity,

FIG. 1 shows only one of the state signals 9 that are output to the digital controller 1 from the geometric kinematic model 8 that is used in this example ~~to the digital controller 1~~.--.

[0030] --FIG. 2 shows details of an NC-model 4 of ~~a~~ an axis, in the form of a schematic functional block diagram. The mechanical characteristics of ~~a~~ an axis and its driver are represented in the form of control circuits. The current estimate of the desired NC-value xs1 coming from the controller 1 and an actual NC-value xi1 produced at the output of the NC-model 4 are combined to produce a differential representation of these two signals that is supplied to the input side of a proportional element P1. ~~In a manner well known in the art, proportional~~ Proportional element P1 produces a calculated velocity value ns1 on its output side, from which an actual velocity value ni1 is subtracted. The velocity offset signal thus produced is supplied to a proportional integration element PI1, which produces a desired momentum value ms1 at its output ~~in a suitable manner well known in the art~~. From the desired momentum value ms1 an actual momentum value mi1 is calculated with the help of a delay element V1 ~~in a suitable manner well known in the art~~. Subsequently, from the actual momentum value mi1 the NC model 4 calculates the actual speed ni1 using the first integration element I1, and calculates the current actual NC-value xi1 of the axis using both integration elements I1 and I2. Subsequently these two values, ni1 and xi1, supply feedback within the NC-model and the current actual NC-value xi1 becomes an input variable for the mechanism model 8.--.

[0031] --FIG. 3 shows details of a PLC-model 5 for ~~a~~ an axis in the form of a schematic functional block diagram. A binary desired PLC-value xs2 produced by the controller 1 is supplied to a switch element S1. When the binary desired PLC-value xs2 changes from a logical "0" to a logical "1", a desired velocity value ns2 is provided at the output of the switch element S1 ~~in a suitable way well known in the art~~. An actual velocity value ni2 produced within the PLC model 5 is subtracted

from that desired velocity value ns2 and the difference is supplied to a proportional integration element PI2, which produces a desired momentum value ms2 at its output ~~in a suitable manner well known in the art~~. From the desired momentum value ms2 an actual momentum value mi2 is calculated with the help of a delay element V2~~ in a suitable manner well known in the art~~. Subsequently, from the actual momentum value mi2 the PLC model 5 calculates the actual speed value ni2 using the first integration element I2, and calculates the actual NC-value xi2 of the axis using both integration elements I3 and I4. Subsequently the actual speed value ni2 supplies feedback within the PLC-model and the current actual PLC-value xi2 becomes an input variable for the mechanism model 8.--.